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SCALING PROPERTIES OF THE CRITICAL NUCLEUS IN CLASSICAL AND DENSITY FUNCTIONAL NUCLEATION THEORIES

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Scaling relations are developed for the number of molecules in the critical nucleus, g^* , and the nucleation barrier height, W^* . Density functional (DF) calculations for vapor-liquid nucleation confirm these relations and show systematic departure of the ratio $W^*/(g^* \Delta\mu)$ from its classical value, $1/2$, with increasing difference in the chemical potential between the supersaturated vapor and bulk condensed phase, $\Delta\mu$. Discrepancies between classical and DF nucleation theories and between the classical theory and experiment are interpreted using these results.